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Public Policies and Saving in Developing Countries

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and
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Developing countries can increase their national saving rate best by increasing government saving. The most effective way to increase national saving is through a permanent tax hike, a cut in current public spending, and a macroeconomic framework in which inflation is low and incentives are predictable.

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Corbo and Schmidt-Hebbel analyze the effectiveness of public policy in raising saving in developing countries, drawing on estimates of consumption functions for 13 developing countries. First, they provide evidence from time-series and panel data on how liquidity constraints affect consumption functions. This suggests that a rise in public saving does not produce an equal reduction in private saving.

Second, they present direct evidence of the link between private consumption and government saving — based on a more general consumption specification implemented for 1980-87 country panel data. These show that indirect effects of public policies on private saving — through changes in domestic inflation and real interest rates — are negligible. But cuts in current public spending and current tax hikes significantly affect private savings.

Increasing public saving by cutting current-period public expenditures by $1 reduces private saving by only 16 to 50 cents. Permanent cuts in public spending reduce private saving by 47 to 50 cents.

Not surprisingly, a higher permanent tax hike has less of an effect on private saving than a transitory tax hike. For each $1 increase in permanent taxes, private saving declines only 23 to 26 cents. Increasing only current-period taxes reduces private saving between 48 and 65 cents.

Increasing taxes and improving tax compliance are the most efficient ways to reduce public deficits when traditional tax revenue is low and inefficient tax levies (such as the inflation tax) are high and widespread. Finally, public policy can help raise private savings and make their use more efficient by providing a macroeconomic framework in which inflation is low and incentives are predictable.

Public Policies and Saving in Developing Countries

by
Vittorio Corbo
and
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1. Introduction

> "The most direct tool at the government's disposal for altering the national saving rate is changes in the level of public saving or dissaving ... The potentially direct linkages between the rate of public saving and the level of national saving suggest that if altering the rate of national saving is a policy goal, this goal should be assigned to deficit policy" (L. Summers (1985), pp. 8-9).

In the late 1970s and early 1980s low international real interest rates and easy access to private capital markets facilitated a large expansion in developing country domestic expenditures that resulted in persistent current account deficits and accumulation of large external debts. Public external debt accumulation in many cases was much above what can be accounted for by current account deficits, as public sector borrowing also financed capital flights. When voluntary commercial lending was severely curtailed -- following Mexico's difficulties in serving its debt -- the boom transformed into a major crisis in many countries. When after 1982 foreign borrowing was not more available, the private and public sector deficits (investments minus savings) had to be cut accordingly.

The reduction in foreign saving was associated in many cases with a recession and a decline in national saving. The public saving to GDP ratio dropped as the public sector had to cope with higher foreign interest payments resulting from increased debt stocks, higher interest rates, and real devaluations. At the same time revenues fell together with income. The decline in the private saving to GDP ratio followed from partial consumption smoothing during the cyclical downturn. The final result was lower saving, a recession, higher real interest rates and a collapse in investment.

Investment rates declined for several reasons. Public investment contracted because of the deterioration in fiscal conditions and the incapacity or unwillingness of governments to reduce current expenditures. Private investment declined because of lower or negative growth, higher real interest rates and an increase in uncertainty associated to the macroeconomic crisis and initial doubts about the sustainibility of the change in relative prices and

incentives.

For countries to resume sustainable growth, major distortions have to be reduced and investment rates will need to increase from the depressed 1983-85 levels. Recovery of investment requires a predictable macroeconomic environment, stable incentives and higher saving rates at a given real interest rate. As it is most likely that foreign saving will remain low in the foreseeable future, a major effort to increase national saving will be needed.

Empirical evidence shows that private saving rates are usually not very sensitive to changes in macroeconomic and financial policies. Raising real interest rates often induces shifts in portfolio composition but has ambiguous or minor effects on saving. However, private saving rates are very sensitive to the economic cycle as a result of consumption smoothing.

Public sector saving rates can be increased more directly through reforms of public enterprises, local government finances and the central government budget. However, if private saving rates are negatively affected by an increase in public saving rates, then the prospects for an increase in national saving rates will be much reduced. The effect of public saving on national saving is an empirical question which is the main focus of this paper.

The rest of the paper is divided into 5 sections. Section 2 reviews the evidence on saving and investment rates in a group of 13 developing countries. Next a two-step approach is followed to analyze the impact of public policies, and particularly of public saving, on private saving. First, section 3 provides evidence on the importance of liquidity constraints affecting consumption levels in developing countries and thus gives indirect support to the notion that an increase in public saving does not result in an equal reduction in private saving. The second step, in section 4, provides direct evidence on the link between private consumption and government saving using a more general consumption specification. Section 5 analyzes the implications of our findings for the design of policies to promote an increase of national saving. Section 6 presents the main conclusions.

2. Saving and Investment Rates: A First Look

Table 1 presents data on average saving and investment rates in a group of 13 countries, 8 of them in Latin America. The average national saving rate in this sample of developing countries dropped substantially up to 1982-83 and started a slow and partial recovery thereafter. The average foreign saving rate reached its peak in 1981 and then decreased substantially reaching its lowest value in 1986. Gross domestic investment also reached its peak in 1981 and then decreased continuously thereafter reaching its lowest value in 1984. From 1984 to 1987 the average gross domestic investment rate of these countries increased almost 2 percentage points of GDP. The recovery of national saving, starting in 1984, is caused by some increase in public saving and a strong recovery of private saving rates, which have risen by more than 3 percentage points of GDP since 1983.

We conclude from this preliminary evidence that for developing countries, in the short run, the evolution of the national saving rate is mostly accounted by movements in the private saving rate and to a lesser extent by changes in public saving. To different degrees, both private and public saving rates appear to be procyclical. This suggests that variations in public saving are not (entirely) offset by private saving changes.

In the following two sections we examine this evidence in a more systematic way using individual country data and controlling for other factors.

3. Is there Evidence of Liquidity Constraints?

In assessing the effect of public policies, and particularly public saving, on private saving, we follow a two-step approach. First, in this section we test the permanent income hypothesis by comparing the sensitivity

Table 1

SAVING AND INVESTMENT RATES IN 13 DEVELOPING COUNTRIES: 1980-87

(% of GDP)

	Private Saving	Public Saving	National Saving	Foreign Saving	Gross Domestic Investment
1980	8.3	9.4	17.6	4.9	22.5
1981	7.7	8.0	15.7	7.4	23.1
1982	6.2	7.4	13.6	7.0	20.6
1983	5.9	7.2	13.1	4.9	18.0
1984	6.6	7.8	14.3	2.9	17.3
1985	6.4	8.3	14.8	2.7	17.5
1986	7.7	7.6	15.3	2.2	17.5
1987	9.3	7.3	16.7	2.8	19.5

Notes:

(i) The Latin American countries are: Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru, Venezuela, and the non-Latin countries are Ghana, Pakistan, Philippines, Thailand and Zimbabwe.

(ii) The ratios are calculated as unweighted averages of country current price data.

(iii) The sources for national saving, foreign saving, gross domestic investment and GDP is the Andrex Data Base of the World Bank. See appendix 2.

(iv) Public saving is computed as revenue minus expenditures -- excluding the inflation component of domestic debt -- of the consolidated non-financial public sector.

of private consumption to permanent income with its dependence on current income and liquid wealth in developing countries. If and by how much consumers react to current income and asset holdings sheds indirect light on the effectiveness of fiscal policies in raising aggregate saving by increasing public saving. Section 4 pursues the second step, by analyzing the sensitivity of private consumption to a broader set of income measures, public policies and relevant prices.

Following Hayashi (1982) we assume the existence of two types of consumers.[1] The first group is composed by rational intertemporal-optimizing individuals whose stationary consumption levels follow Hall's (1978) random walk process consistent with the permanent income hypothesis (PIH). The second group makes its consumption decisions influenced by current income and liquid asset holdings, because it either faces liquidity constraints or is uncertain about its permanent income levels.[2]

The following reduced-form equation reflects aggregate consumption behavior derived by adding the consumption processes for the two groups (Appendix 1 presents the derivation of the corresponding structural form):

$$(1) \quad c_t = \theta_0 + \theta_1 c_{t-1} + \theta_2 y_t - \theta_3 y_{t-1} + \theta_4 m_t - \theta_5 m_{t-1} + \upsilon_{1t}$$

where c is private consumption, y is income, m is the sum of monetary and quasi-monetary asset holdings (broad money), υ_1 is a stochastic error term, and t is a time index. All variables are real, per capita values referred to the aggregate economy.

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[1]Montiel and Haque (1987) and Corbo and de Melo (1989), among others, have used a similar assumption to test for the presence of liquidity constraints.

[2] Uncertainty referred to permanent income or wealth levels due to the fact that income does not follow a stable time series process and hence future income levels are hard to predict leads to static or adaptive expectations of future variables even if consumers are rational forward-looking optimizers who do not face liquidity constraints (see Schmidt-Hebbel, 1987). This type of uncertainty seems to be a relevant characterization of income processes subject to disparate foreign and domestic policy shocks, observed in many developing economies during the eighties.

Under the permanent income hypothesis in its simple, consumption random-walk version, the coefficient θ_1 is 1 and all other coefficients are zero. The simple Keynesian theory and the uncertain permanent income hypothesis postulate that θ_0 and θ_2 are positive while the remaining coefficients are zero. Cash-in-advance and other liquidity constraint hypotheses add money to current income as consumption determinants, implying that θ_4 is added to θ_0 and θ_2 as positive coefficients under the null hypothesis.

However, more than focusing on these extreme and partial hypotheses, our interest resides in deriving and comparing the coefficients - which a priori could all be significantly different from zero - to shed light on the relative role of permanent income, current income and monetary-financial assets in determining private consumption in developing countries.

Equation (1) was estimated for a sample of 13 developing countries which jointly represent 91% of the region's GNP in 1988.[3] Table 2.1 reports the country by country results for annual data covering the 1968-1988 sample period obtained from two-stage least squares estimations.[4] The results tend to confirm the joint existence of the two consumer groups as embodied in equation (1). Income and/or money are significant consumption determinants in all countries and lagged consumption is significant in 9 countries.

Country results differ widely from each other with respect to significancy levels and magnitudes of the 5 determinants; they are all individually significant in Chile and Colombia only. However, Hall's random walk hypothesis is widely rejected in 11 countries, and marginally rejected in Argentina and Zimbabwe, as reflected by the log-likelihood ratio test statistics in the last column.

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[3] The countries are Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru, Venezuela, Ghana, Pakistan, Philippines, Thailand and Zimbabwe. For variable definitions, data sources and transformations see appendix 2.

[4] This instrumental variables method was applied because of potential biases due to the presence of the lagged dependent variable and current income in the right-hand side. See table 2.1 for the instruments used here.

Table 2.1

CONSUMPTION IN DEVELOPING COUNTRIES (1968-1988)
(Country by Country TSLS estimation)

Dependent Variable: Per Capita Private Consumption (c)

Country	Const.	c_{-1}	y	y_{-1}	m	m_{-1}	AR(1)	DW	RBAR2	LRT
1. Argentina	836.2 (10.7)	0.45 (0.7)	0.12 (0.3)	0.03 (0.1)	0.39 (1.9)	-0.20 (-0.9)	-	1.90	0.49	14.3
2. Brazil	35.1 (0.5)	0.34 (0.5)	0.55 (3.5)	-0.08 (-0.2)	-0.26 (-1.0)	0.20 (0.8)	-	2.59	0.99	33.4
3. Chile	-197.9 (-0.6)	1.20 (3.1)	0.60 (3.4)	-0.65 (-1.7)	0.56 (2.2)	-0.67 (-2.4)	-	2.44	0.77	22.1
4. Colombia	24.9 (1.4)	0.81 (4.78)	0.40 (4.4)	-0.26 (-1.6)	0.77 (3.5)	-0.93 -4.9)	-	2.16	0.997	38.1
5. Costa Rica	-104.6 (-0.6)	1.09 (3.3)	0.82 (3.6)	-0.82 (-2.7)	-0.19 (-0.6)	0.19 (0.6)	-	1.79	0.90	29.1
6. Mexico	135.7 (2.1)	0.60 (2.9)	0.44 (5.8)	-0.20 (-1.6)	0.34 (2.9)	-0.42 (-2.5)	-	2.16	0.99	54.4
7. Peru	21.7 (0.1)	1.25 (3.3)	0.75 (2.7)	-0.88 (2.4)	0.15 (0.2)	-0.50 (-0.6)	-	1.84	0.66	16.3
8. Venezuela	219.3 (0.3)	0.79 (3.0)	-0.11 (-0.4)	0.12 (0.5)	1.20 (4.7)	-1.03 (-3.9)	-	1.00	0.66	22.9
8.A. Venezuela (AR1,1969-88)	457.0 (0.8)	0.55 (2.0)	-0.16 (-0.9)	0.18 (0.9)	1.38 (6.9)	-0.96 (-2.6)	0.61 (2.1)	1.58	0.76	-
9. Ghana	215.5 (1.4)	0.47 (0.9)	0.66 (4.5)	-0.40 (-0.9)	-0.22 (-0.4)	0.33 (0.9)	-	2.85	0.94	43.4
9.A Ghana - (AR1,1968-88)	26.6 (0.2)	1.00 (2.4)	0.78 (8.7)	-0.83 (-2.4)	-0.36 (-1.0)	0.54 (2.0)	-0.66 (-0.5)	2.36	0.96	
10. Pakistan	12.7 (1.0)	0.27 (0.4)	0.76 (3.7)	-0.08 (-0.1)	-0.55 (-2.5)	0.22 (0.7)	-	1.36	0.96	25.8
10.A Pakistan (AR1, 1969-88)	17.8 (0.9)	0.34 (0.5)	0.82 (4.1)	-0.26 (-0.4)	-0.54 (-2.4)	0.30 (0.8)	0.29 (0.2)	1.82	0.96	-
11. Philippines	-7.7 (-0.5)	0.89 (12.5)	0.23 (3.6)	-0.15 (-2.2)	-0.05 (0.4)	0.03 (0.3)	-	1.85	0.98	27.1
12. Thailand	11.2 (0.4)	0.81 (1.6)	0.36 (5.7)	-0.24 (-0.8)	0.05 (0.5)	-0.05 (-0.4)	-	2.20	0.996	36.5
13. Zimbabwe	-31.8 (-0.3)	1.45 (3.2)	0.68 (2.7)	-1.15 (-2.6)	-1.00 (-1.1)	1.93 (1.6)	-	2.44	0.82	15.2

Notes:

(i) The specification corresponds to equation (1).

(ii) Two stage least squares (TSLS) was used to instrumentalize the lagged dependent variable (c_{-1}) and current income (y), using the following four instruments: per capita gross domestic investment, exports, and the second lags of income and money.

(iii) Lines 1-8 present results for all countries, based on TSLS without first-order serial correlation (AR1). Equations 8.A, 9.A and 10.A present results for TSLS with AR(1) estimations; corresponding equations for the other 10 countries rendered non-significant first-order serial correlation coefficients.

(iv) t-statistics are in parenthesis, DW is the Durbin-Watson statistic, and RBAR2 is the adjusted R^2. The same format is used in the other tables.

(v) LRT is the log likelihood ratio test statistic computed for Hall's null hypothesis that only c_{-1} is significant, based on the difference between log likelihood values of the above results and those of the restricted specifications. The corresponding value of the χ^2 distribution for a 1% confidence level and 4 degrees of freedom is 13.3.

Table 2.2

CONSUMPTION IN DEVELOPING COUNTRIES (13 COUNTRIES, 1968-1988)
(Fixed Effects Panel Estimation)

Dependent Variable: Per Capita Private Consumption (c)

	c_{-1}	y	y_{-1}	m	m_{-1}	DW	RBAR2	FT
1. Panel Unweighted LS	0.85 (16.6)	0.25 (5.0)	-0.20 (-3.5)	0.50 (9.0)	-0.44 (-7.2)	1.79	0.74	66.7
2. Panel Weighted LS	0.78 (16.8)	0.27 (7.8)	-0.15 (-3.6)	0.43 (8.0)	-0.43 (-7.3)	1.70	0.95	92.0

Dependent Variable: Change in per capita private consumption $\Delta c = c - c_{-1}$

	Δy	Δm	DW	RBAR2
3. Panel Unweighted LS	0.36 (7.9)	0.49 (9.2)	2.06	0.46
4. Panel Weighted LS	0.41 (12.9)	0.30 (5.8)	2.09	0.54

Notes:

(i) The specification corresponds to equation (1).

(ii) Fitted, not actual, values for lagged private consumption and current GNP values were used for c_{-1} and y, respectively, to account for their potential correlations with the residuals. The fitted values were obtained from regressing actual c_{-1} and y on the same 4 instruments used in the country-by-country estimations of table 2.1, mentioned in the note to that table.

(iii) The t-statistics were corrected using the variance-covariance matrix corresponding to the actual (and not fitted) values of c_{-1} and y.

(iv) The weighted LS panel results correspond to the specification with weighted residuals to take care of heteroskedasticity resulting from combining different country data.

(v) FT is the F-test statistic computed for Hall's null hypothesis that only c_{-1} is significant, based on the differences between the restricted and unrestricted R^2s. The corresponding value of the F distribution for a 1% confidence level is 3.1.

(vi) Results for estimations with Seemingly Unrelated Regressions (SUR) technique were similar to those presented above:

c_{-1}	y	y_{-1}	m	m_{-1}
0.80	0.28	-0.21	0.47	-0.42
(23.0)	(15.5)	(-8.1)	(17.2)	(-17.3)

Table 2.2 presents fixed-effects panel estimation results for the 13 countries, for both unweighted and weighted least squares (lines 1 and 2, respectively), the latter to take care of heteroskedasticity stemming from having a different variance for the random error of the equation for different countries.[5] Each consumption determinant contributes very significantly to private consumption in the sample of developing countries during 1968-88. Similar conclusions were reached using the seemingly unrelated regressions technique, with cross equation restrictions[6]. The consumption random walk hypothesis is strongly rejected, as reflected by the F-test values. While lagged consumption as a proxy for the permanent income hypothesis has a high value, it differs significantly from unity, and current income and money are additional, important determinants of consumption. On the other hand, the extreme Keynesian hypothesis and the money liquidity constraint hypothesis are also separately and jointly rejected as the only determinants of consumption.[7] The same conclusion may be reached with the panel data estimations for the first difference of consumption as a linear function of the first difference of income and money (table 2.2 lines 3 and 4). Hence private consumption in developing countries seems to conform to the existence of (at least) two distinct groups of private agents, as reflected by equation (1). The significant role of current income and real money in private consumption is a first, indirect evidence that fiscal policies, and particularly changes in public saving, are not fully offset by changes in private saving. Our next section is devoted to obtain more direct evidence on how much does the private sector react to changes in fiscal policies.

However, the values of the coefficient for lagged consumption far away from one create some doubts on the interpretation of the estimations. In general

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[5]To address the potential biases stemming from including lagged consumption and current income, we used fitted (not actual) data for these two variables, obtained from running first-stage regressions as explained in note (ii) of table 2.2.

[6]See note (vi) in Table 2.2.

[7]The corresponding test statistics were not presented in table 2.2.

these results should be taken with caution for two main reasons. First, the main source of variation in the right hand side variables is likely to be common across regressors making almost impossible the identification of individual coefficients (although combination of them will be identified). Second, the individual t-statistics should also be taken with caution. These two problems are more important in small samples. To avoid in part these problems we also worked with first differences in the variables in the panel data estimation. However, the results shown in lines 3 and 4 of table 2.2 also strongly support the hypothesis that liquidity and wealth constraints are important determinants of consumption in developing countries.

4. Private Consumption and Public Policies

This section broadens the empirical analysis carried out up to here by specifying a framework to address directly the effects of public policies on consumption in developing countries.

Direct effects of fiscal policies on consumption or saving operate through public saving (or the deficit) and its composition. If the stringent conditions required for Ricardian equivalence are satisfied (i.e. if the private sector is rational forward looking satisfying the PIH, and is able or willing to incorporate the intertemporal public budget constraint into its own), a rise in public saving, if it is done via lower public spending, is exactly offset by an increase in private consumption. As disposable income does not change, the reduction in private saving matches the increase in public saving. A rise in public saving does not affect private consumption at all if it is made possible via higher taxes. But as disposable income is reduced by the size of the tax, the reduction in private saving also matches the increase in public saving (the latter being macroeconomically equivalent to issuing more public debt). The opposite results are predicted by the Keynesian (and permanent income without Ricardian equivalence) hypothesis: current (permanent) taxes matter for consumption, not current (permanent) public spending levels.

The Ricardian hypothesis has been widely rejected in empirical studies for

industrialized countries. Most of these studies identify the existence of pervasive borrowing constraints as the main cause for its rejection.[8] A study for a set of developing countries by Montiel and Haque (1987) tests for two different causes which could explain a deviation from Ricardian equivalence: higher private than government discount rates (due to Blanchard-Yaari infinite-lived households facing a mortality probability) and liquidity constraints. They find significant evidence for the latter causing a deviation from Ricardian equivalence without much support for the former. Borrowing constraints, proxied by current income or financial asset holdings, are also major determinants in the cross-developing country studies for private consumption and household saving by Rossi (1988) and Schmidt-Hebbel, Webb, and Corsetti (1990), respectively.

Indirect effects of public (fiscal-monetary) policies on private consumption operate via the impact of public deficits and their financing on major prices affecting private consumption: real interest rates, inflation, and the real exchange rate. Real interest rates affect private consumption only if the well-known substitution, income and wealth effects do not cancel each other. This seems not to be the case, judging from the growing evidence which shows that consumption is not sensitive to real interest rates.[9] While inflation's first order effect is on the composition of the stock of savings and not on saving or consumption, it may have second-order effects reducing measured saving if it is associated to capital flight or flight into consumer durables,

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[8] For Ricardian equivalence to hold, the main conditions to be satisfied jointly are: absence of liquidity constraints, equal rates of discount for the public and private sectors, and certainty on future income, tax and public sector expenditure flows. For a further discussion of these conditions and surveys of the empirical studies see Hayashi (1985), Bernheim (1987), and Leiderman and Blejer (1989).

[9] Among the studies on the interest-insensitivity of saving in developing countries see, for instance, Giovannini (1985) and Schmidt-Hebbel, Webb, and Corsetti (1990). For an alternative view, see Fry (1988) and Balassa (1989). The cancellation of income and substitution effects of real interest rates on consumption was confirmed in Southern Cone countries by Schmidt-Hebbel (1987) and Arrau (1989), who obtained elasticities of intertemporal consumption substitution in the neighborhood of 1.

or increasing actual (precautionary) saving if it raises uncertainty. An expected devaluation reduces the consumption-based real interest rate and leads to capital flight - the first effect could increase actual consumption while capital flight raises the measured consumption to income ratio if capital flight reduces measured income.[10]

Monetary policy and financial reform affect the aggregate of monetary and quasi-monetary assets. Broad money increases consumption because it reduces the extent of liquidity constraints (as discussed in section 3), and is a major component of financial wealth.

Finally, and less related to direct public policies, foreign saving impacts on private consumption when it is a (partial) substitute for private saving in a regime of binding foreign resource constraints.

Let's start the discussion of a relevant framework for assessing the impact of public policies on private consumption by referring to a standard form for testing the Ricardian equivalence proposition, based on Bernheim's (1987) survey:

$$(2) \quad C_{pt} = \alpha_0 + \alpha_1 (YN_t - T_t + i_t D_t) + \alpha_2 (T_t - E_{Gt} - i_t D_t) + \\ + \alpha_4 D_t + \alpha_5 W_t + \upsilon_{2t}$$

where C_P is private consumption, YN is national income, T is tax revenue net of transfers and subsidies to the private sector, i is the nominal interest rate, D is government domestic debt, E_G is public spending, W is private wealth (net of governmenc domestic debt), and υ_2 is a stochastic error term. Hence the first right-hand determinant is private disposable income and the second is the nominal or total government surplus.

Three simple null hypotheses can be tested with this specification:

(i) Keynesian hypothesis : $\alpha_0 > 0$, $\alpha_1 > 0$, other coefficients 0;

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[10] For the theory and the Latin American experience on the role of consumption-based real interest rates on intertemporal consumption allocation see Dornbusch (1983, 1985), and for the relation between saving and capital flight see Dornbusch (1989).

(ii) Permanent income hypothesis without Ricardian equivalence: $\alpha_4 > 0$, $\alpha_5 > 0$, other coefficients 0;

(iii) Ricardian equivalence hypothesis: $\alpha_1 = \alpha_2 > 0$, other coefficients equal to 0.

This standard specification presents various shortcomings.[11] First, public saving and not the public surplus should be the relevant determinant in equation (2), because public investment adds to real capital and therefore constitutes "net wealth" in the sense of Barro (1974). Second, under inflation only the real component of domestic interest payments should enter both private disposable income and the government surplus (saving)[12]. Third, permanent, not current private disposable income and public surplus (saving) should enter (2) for a fair test of the Ricardian proposition. Fourth, additional potential consumption determinants, such as foreign payments and the real interest rate or inflation, should be included. Finally, the role played by the public sector surplus may not reflect Ricardian behavior but could obey to direct crowding-out effects and to institutional arrangements by which the public sector captures private saving either directly or through the domestic financial markets. As both hypotheses are not distinguishable, one should refer to the joint Ricardian/direct crowding-out hypothesis when introducing the public sector surplus as a private consumption determinant.

The following specification for the private consumption to private disposable income ratio takes care of the above mentioned shortcomings of equation (2). In addition, the scaling to private disposable income reduces the extent of non-stationarity of the time series and makes cross-country data comparable. Hence the private consumption rate is specified as:

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[11] Bernheim (1987) addresses the third and fourth limitations discussed below.

[12] The inflation component of interest payments on the public debt, which compensates for the loss in principal due to inflation, is put back into public bond holdings by private investors. For a further discussion see Tanzi et al. (1987).

$$(3)\quad \frac{C_{Pt}}{DY_{Pt}} = \beta_0 + \beta_1 \frac{PDY_t}{DY_{Pt}} + \beta_2 \frac{PS_{Gt}}{DY_{Pt}} + \beta_3 r_t + \beta_4 INF_t + \beta_5 \frac{M_t}{DY_{Pt}} + \beta_6 \frac{FS_t}{DY_{Pt}} + \upsilon_{3t}$$

where DY_P is current private disposable income, PDY_P is permanent private disposable income, PS_G is permanent public saving, r is the real interest rate, INF is domestic inflation, M is broad money, FS is foreign saving, and υ_3 is a stochastic error term.

Permanent private disposable income and permanent public saving are consistent with the following definitions for their corresponding current values:

$$(4)\quad DY_{Pt} \equiv GDP_t - NFP_{Pt} - T_t + r_t D_t$$

$$(5)\quad S_{Gt} \equiv T_t - C_{Gt} - NFP_{Gt} - r_t D_t$$

where GDP is gross domestic product, NFP_P is net foreign payments made by the private sector, S_G is current public saving, C_G is public consumption, and NFP_G is net foreign payments made by the public sector.

Note that now the coefficients β_0, β_1, and β_2 in equation (3) reflect more appropriately the Keynesian, permanent income, and Ricardian/direct crowding out hypotheses, respectively. According to the definition in (4), public saving is now consistent with the operational public deficit concept. Under the Ricardian hypothesis, $\beta_1=\beta_2$, and hence the Ricardian permanent private disposable income concept results from adding PDY and PS_G, which is permanent GDP net of permanent total net foreign payments and permanent public consumption. Under the direct crowding-out hypothesis, β_2 is positive and could easily be larger than β_0 or β_1.

Using a data set for operational non-financial public sector deficits for the 1980-87 sample of 13 developing countries introduced in section 2, we proceed

to estimate equation (3) for that sample.[13] Due to the brevity of the available time series we are restricted to a panel estimation. Table 3.1 presents the estimation results for a fixed-effects weighted least squares panel. The results differ by the assumptions made on permanent public saving,[14] the inclusion of the rates of real interest and inflation, money, and period-dummies for 1980-82 or 1980-83.[15] [16]

The results tend to be quite robust to the different specifications and estimation methods. While the marginal propensity to consume out of current private disposable income hovers around 0.60 (the fixed-effect constants, mentioned in footnote 16, vary between 0.49 and 0.79, depending on each country), the propensity to consume out of permanent income is significantly lower, varying around 0.24. Therefore there is only partial evidence for intertemporal consumption smoothing in these developing countries: for each percentage point increase in current (transitory) income vis-a-vis permanent income, the private consumption rate declines by one fourth -- much less than the 1.0 fall predicted by the PIH.

Private consumers respond to long-term or "permanent" public saving, however, by much less than the 1.0 coefficient predicted by either the Ricardian or direct crowding-out propositions. Nonetheless, the impact of public saving is sizable: for each $1 increase in public saving, private consumption

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[13]On variable definitions, sources and transformations see appendix 2, which also presents in table A1 country-by-country time series of operational consolidated non-financial public sector deficit, public saving, private saving, and private disposable income, all scaled to GDP.

[14] Under the first hypothesis of partial forward-looking expectations, PS_{Gt} is constructed as an arithmetic average of current and future, actual public saving, two periods into the future, while under the static expectations alternative current public saving is used (See appendix 2).

[15]The 1980-82 (1980-83) dummies test for a structural break in 1983 (1984) due to the eruption of the debt crisis and/or domestic recessions, not sufficiently captured by the changes in the business cycle (PDY_p/DY_p) and foreign saving (FS/DY_p). The dummies are 1 for 1980-82 (83), 0 otherwise.

[16]The fixed-effect coefficients for each country, corresponding to the estimations of table 3.1, are available on request.

Table 3.1

PRIVATE CONSUMPTION IN DEVELOPING COUNTRIES (13 COUNTRIES, 1980-1987)
(Fixed-Effects Weighted Least Squares Panel Estimation)

Dependent Variable: Private Consumption to Private Disposable Income Ratio (Cp/DYp)

		$\frac{PDY_p}{DY}$	$\frac{PS_G}{DY}$	r	INF	$\frac{M}{DY_p}$	$\frac{FS}{DY_p}$	Dummy	$RBAR^2$	DW
I.	Forward Looking PS_G									
1.1	Complete Specification without Dummies	0.260 (4.9)	0.481 (7.5)	0.008 (0.6)	-0.026 (-0.7)	-0.013 (-0.3)	0.425 (7.2)	--	.52	1.09
1.2	Complete Specification Dummy 80-82	0.226 (4.1)	0.417 (6.1)	-0.006 (-0.5)	-0.030 (-0.8)	0.057 (1.3)	0.465 (6.2)	-0.024 (-3.3)	.46	1.24
1.3	Complete Specification Dummy 80-83	0.283 (5.1)	0.434 (6.4)	-0.001 (-0.1)	-0.018 (-0.5)	0.071 (-1.6)	0.490 (6.3)	-0.021 (-2.9)	.49	1.20
1.4	Partial Specification without Dummies	0.241 (4.8)	0.473 (7.3)				0.413 (7.0)		.53	1.11
1.5	Partial Specification Dummy 80-82	0.207 (4.1)	0.417 (6.2)				0.451 (6.2)	-0.019 (-3.0)	.46	1.24
1.6	Partial Specification Dummy 80-83	0.256 (5.0)	0.422 (6.3)				0.468 (6.2)	-0.017 (-2.7)	.47	1.18
II.	Static Expectations PS_G									
2.1	Complete Specification without Dummies	0.239 (4.5)	0.555 (8.3)	-0.011 (-1.0)	-0.003 (-0.1)	-0.060 (-1.8)	0.381 (5.7)		.55	1.11
2.2	Complete Specification Dummy 80-82	0.227 (4.0)	0.514 (6.8)	-0.018 (-1.7)	-0.028 (-0.7)	-0.112 (-2 6)	0.398 (5.1)	-0.018 (-2.3)	.49	1.18
2.3	Complete Specification Dummy 80-83	0.265 (4.5)	0.504 (6.8)	0.015 (-1.3)	-0.008 (-0.2)	-0.110 (-2.6)	0.420 (5.1)	-0.016 (-2.2)	.50	1.16
2.4	Partial Specification No Dummy	0.237 (4.7)	0.497 (7.2)				0.393 (6.0)		.49	1.10
2.5	Partial Specification Dummy 80-82	0.214 (4.1)	0.435 (5.6)				0.376 (4.8)	-0.010 (-1.4)	.41	1.15
2.6	Partial Specification Dummy 80-83	0.243 (4.4)	0.425 (5.5)				0.390 (4.9)	-0.009 (-1.3)	.41	1.13

Notes:

(i) The specification corresponds to equation (3).

(ii) The weighted least squares panel results correspond to a specification with weights to take care of heteroskedasticity resulting from combining different country data.

(iii) Fitted foreign saving values and not actual values were used in the regressions, in order to address the possible simultaneity between consumption and the current account deficit during 1976-1981. The regressors of foreign saving were lagged foreign saving, permanent income over actual income and lagged permanent income over actual income.

(iv) Different specifications with dummies for Argentina and Venezuela during some sub-periods were tried. Although the improvement in fits were large (RBAR2 around .80), there were only slight changes in the values of the parameters.

increases (private saving declines) by an average $0.44 (under the forward-looking hypothesis), to $0.49 (under the static expectations hypothesis). We hypothesize that this coefficient reflects both direct crowding-out effects of public deficit financing and Ricardian behavior of private consumers, and possibly more the former than the latter.[17]

Real interest rates, inflation rates, and broad money do not have consistently significant influences on private consumption in our results. Hence lines 1.4-1.6 and 2.4-2.6 of tables 3.1 present results omitting these variables.

The coefficient of the real interest rate is negative in most results, but never attains standard acceptable significance levels. This is consistent with most of the empirical literature, as discussed above. Similarly, inflation has a non-significant, small and negative influence on private consumption.

Broad money plays an ambiguous, non-significant role under the forward-looking specification. However, it shows a small, negative and significant coefficient under the static-expectations alternative, contradicting our priors with regard to its sign.

Finally, foreign saving has a major and consistently positive effect on private consumption in our sample of 13 developing countries. According to the results, foreign saving is a partial substitute of private saving: for each $1 increase in the current account deficit, private consumption increases by an average $0.42, the remainder financing public consumption or gross domestic investment.

The results discussed here tend to reject the Keynesian, permanent income and Ricardian/direct crowding-out hypotheses in their extreme forms, which exclude all other theories. In fact, there is strong evidence for the joint contribution of Keynesian cum liquidity constraint determinants as well as permanent income and Ricardian/direct crowding-out elements in explaining developing countries private consumption in the eighties. However, it is more illuminating to compare

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[17]Direct crowding out of private consumption by public deficit can occur in countries where the public sector has preferential access to resources of the private sector. This is the case in some of our sample countries, such as Thailand and Zimbabwe.

the relative magnitudes of the significant determinants of private consumption or saving than to stick to the straightforward rejection of each of the simple theories; precisely this is one of the objectives of the next section.

5. Estimating the Effects of Public Sector Saving on Private Saving

To analyze the impact of public saving on private saving and hence on national saving, we make use of the results for private consumption behavior reported in table 3.1 based on equation (3). Rewrite equation (3) in terms of private saving levels and use the coefficients of table 3.1 for the following private saving equations:

$$(6.1)\quad S_{Pt} = (1 - cons_i)\, DY_{Pt} - 0.24\, PDY_{Pt} - 0.47\, PS_{Gt} - 0.41\, FS_t$$

$$(6.2)\quad S_{Pt} = (1 - cons_i)\, DY_{Pt} - 0.24\, PDY_{Pt} - 0.50\, PS_{Gt} - 0.39\, FS_t$$

where the coefficients in (6.1) are the estimated parameters presented in line 1.4 of table 3.1 (forward-looking permanent public saving), and those in (6.2) are consistent with the parameters of 2.4 (static-expectations permanent public saving). The country-specific coefficient $cons_i$ is the fixed-effects parameter for country i.

Table 4.1 computes the partial effects on private saving of various changes in income and fiscal policy variables, calculated from equations (6.1) and (6.2) after substituting the identities (4) and (5). As already discussed in section 3, private saving (or consumption) in developing countries tends to be more sensitive to current than to permanent income shocks, with corresponding marginal propensities in the neighborhood of 0.40 and 0.24, respectively (table 4.1, lines 1 and 3).

For each $1 increase in "permanent" or longer-term public saving, achieved by a "permanent" $1 decrease in public consumption, private saving declines by 47-50 cents - a far cry from the 1.0 offset coefficient predicted by the Ricardian/direct crowding-out hypotheses (lines 4 and 5). If the "permanent"

public deficit reduction is achieved by reducing the long-term tax burden, private saving falls by 23-26 cents for each $1 increase in permanent taxation (line 6). Note that if permanent income and permanent public saving had the same coefficient, which would be a necessary (but not sufficient) condition for Ricardian equivalence to hold, the effect of long-term taxes on private saving would be nil.

The responsiveness of saving to current income and fiscal policy shocks depends significantly on how the private sector forms its expectations on permanent variables, as can be seen when comparing the propensities in columns 1 and 2 of table 4.1.

Hence a $1 increase in current public saving (which determines expected permanent public saving fully under static expectations but only partly under partial perfect foresight), achieved by reducing current public expenditure, reduces private saving by 16 to 50 cents, depending on the underlying expectations. However, if the reduction of the current public deficit is pursued via increasing current taxes, the effect would be much stronger, as a tax increase affects current and expected permanent private disposable income, in addition to permanent public saving. For each $1 of higher current taxes, private saving declines on average (through countries) 48 or 65 cents, depending on how expectations are formed.

From the empirical results we have found that in the short to medium term an increase in public saving has a strong positive effect on national saving. However, the way in which the increase takes place -- increase in current taxes or decrease in current expenditures -- and the way by which expectations are formed, affect significantly the final impact.

It is clear from our empirical work that, in the short to medium run, raising public saving is the most effective and sure way to increase national saving. Raising public saving, for a given level of public investment, also contributes to reduce the public sector deficit and therefore restores macro balances. Summers (1985) has made the same policy recommendation for the U.S.,

Table 4.1

RESPONSE OF PRIVATE SAVING TO CHANGES IN PUBLIC SAVING, PUBLIC EXPENDITURE AND TAXES

	Marginal Saving Propensities consistent with Eq. 6.1	Marginal Saving Propensities consistent with Eq. 6.2
1. $\frac{dS_{Pt}}{dDY_{Pt}}$	$[1-\beta_0] = [0.29;0.50]$	$[1-\beta_0'] = [0.28;0.49]$
2. $\frac{dS_{Pt}}{dDY_{Pt+1}}$	$-\beta_1/3 = -0.08$ (SE=0.02)	0
3. $\frac{dS_{Pt}}{dPDY_{Pt}}$	$-\beta_1 = -0.24$ (SE=0.05)	$-\beta_1' = -0.24$ (SE=0.05)
4. $\frac{dS_{Pt}}{dPS_{Gt}}$	$-\beta_2 = -0.47$ (SE=0.08)	$-\beta_2' = -0.50$ (SE=0.07)
5. $\frac{dS_{Pt}}{dPC_{Gt}}$	$\beta_2 = 0.47$ (SE=0.08)	$\beta_2' = 0.50$ (SE=0.07)
6. $\frac{dS_{Pt}}{dPT_t}$	$\beta_1-\beta_2 = -0.23$ (SE=0.09)	$\beta_1'-\beta_2' = -0.26$ (SE=0.09)
7. $\frac{dS_{Pt}}{dS_{Gt}}$	$-\beta_2/3 = -0.16$ (SE=0.02)	$-\beta_2' = -0.50$ (SE=0.07)
8. $\frac{dS_{Pt}}{dC_{Gt}}$	$\beta_2/3 = 0.16$ (SE=0.02)	$\beta_2' = 0.50$ (SE=0.07)
9. $\frac{dS_{Pt}}{dT_t}$	$-[1-\beta_0] + \beta_1/3 - \beta_2/3 = [-0.58;-0.37]$	$-[1-\beta_0'] + \beta_1' - \beta_2' = [-0.75;-0.54]$

Notes

(i) SE corresponds to the standard error of the parameter(s).

(ii) Lines 1 and 9 show the minimum and maximum country fixed-effects coefficients $cons_i$.

quoted at the start of this paper. Increasing public saving helps countries experiencing higher inflation and unsustainable current account deficits. For countries that have already made progress in stabilization but need now to start growing again, raising public saving -- for a given level of a sustainable current account deficit -- will be required for achieving higher investment levels (both private and public). The problem in many countries is to find ways of raising public saving. Here most countries will need to work on many fronts.

First, the narrow public revenue base can be extended through improving tax administration and the introduction of broadly based uniform rate taxes, such as VATs, and increased reliance on user charges for the provision of public services with appropriate compensation schemes to protect the poor. Second, public expenditures have to be scrutinized more carefully in terms of their costs and benefits. In many countries, public expenditures should be shifted toward high priority, social and physical infrastructure and away from ill-conceived subsidies and low-return capital expenditure. Third, reforms in local government and state enterprises are required. Decentralizing spending and revenue authorities can improve the efficiency of the public sector by having a more direct link between the costs and benefits of local services. Public enterprises can increase their contribution to government saving by rationalizing pricing policies, improving their efficiency and a more careful evaluation of their investment projects.

6. Conclusions[18]

The analysis of this paper suggests that if the objective of developing countries is to increase their national saving rate, then public policy could be used to reach this goal through an increase in government saving. From the empirical estimations we found that a $1 transitory increase in public saving, achieved by cutting current-period public expenditures, reduces private saving by 16 to 50 cents. However, if the same increase in public saving is achieved

[18]The source of the data mentioned in this section is Easterly (1989).

by raising current-period taxes, private saving declines on average between 48 to 65 cents. The main source of the differential effect of reducing government expenditure vis-a-vis increasing taxes arises from the effect of tax increases on both current and permanent income levels. For lasting public sector reforms, it is more important to assess the effects of permanent fiscal policy changes. Not surprisingly, higher permanent taxation has a smaller effect on private saving than that of a transitory tax hike: for each $1 increase in permanent taxes, private saving declines only by 23 to 26 cents. Permanent public expenditure cuts, however, reduce private saving by 47- 50 cents for each dollar, due to the full, combined Ricardian/direct crowding-out effects of permanent public saving on private saving.

The optimal combination of tax increases and current expenditure reductions will undoubtedly depend not only on these coefficients but also on the initial situation of each country. Cutting inefficient current expenditure is - from the viewpoint of growth - the most beneficial expenditure-side method of reducing public deficits. For instance, Mexico has been able to reduce the share of non-interest current government expenditures from 25.5% of GDP in 1982 to 20.2% in 1987, and Chile from 11.5% of GDP in 1982 to 8.3% of GDP in 1987. For the same time period, Argentina's share went from 20.7% to 23.1% of GDP.

Increasing taxes and improving tax compliance are the most efficient methods of reducing public deficits when traditional tax revenue is low and inefficient tax levies (such as the inflation tax) are widespread and high. In Brazil, a country with a relatively high initial tax revenue share of GDP, traditional tax revenue fell from 25.1% in 1982 to 21.3% in 1987, while inflationary taxation was raised. Mexico, on the other hand, was unable to raise significantly its low traditional tax revenue share between 1982 and 1987, increasing it only from 9.9% to 10.5% of GDP.

Finally, public policy can also make an important contribution to raise measured private saving and the efficiency of its use by providing a macroeconomic framework in which inflation is low and incentives are predictable.

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Appendix 1

This appendix derives a per capita consumption function for an economy composed by two groups of consumers. The first group follows Hall's (1978) random walk process consistent with the permanent income hypothesis, and the second is either uncertain about its permanent income level or liquidity constrained in its consumption decisions. All variables are scaled to the population size. Hence per capita consumption of the unconstrained private sector is given by:

$$(A1) \quad c_t^u = \alpha\, c_{t-1}^u + \epsilon_t^u$$

where c_p is private consumption, ϵ is a stochastic error form and the supraindex u denotes the unconstrained group. The coefficient α is normally equal to 1.

Constrained consumers behave as follows:

$$(A2) \quad c_t^c = \beta + \gamma\, y_t^c + \delta\, m_t^c + \epsilon_t^c$$

where y is private income, m is monetary and quasi-monetary assets, and the supraindex c denotes the aggregate of constrained and/or permanent income-uncertain consumers.

Variables referred to each particular group are unobserved, while aggregate economy-wide variables are observed.

Average per capita consumption is a weighted average of each groups' consumption levels:

$$(A3) \quad c_t = \mu\, c_t^u + (1-\mu)\, c_t^c$$

where μ is the share of the consumption constrained population, satisfying $0 < \mu < 1$.

Solve (A3) for c_t^u, take one lag of the latter, substitute it into (A1), and then substitute the latter back into (A3) to obtain:

$$(A4) \quad c_t = \alpha\, c_{t-1} + (1-\mu)\, c_t^c - \alpha(1-\mu)\, c_{t-1}^c + \mu\, \epsilon_t^u$$

Per capita current income and financial holdings of the second group of consumers are proportional to aggregate per capita income and monetary assets as follows:

$$(A5) \quad y_t^c = \lambda\, y_t$$

$$(A6) \quad m_t^c = \rho\, m_t$$

where λ, $\rho > 0$.

Substitute (A5) - (A6) into (A2), and the latter expression into (A4) to obtain finally:

$$(A7)\quad c_t = (1-\alpha)\,\beta\,(1-\mu) + \alpha\, c_{t-1} + (1-\mu)\,(\gamma\,\lambda)\, y_t - \alpha\,(1-\mu)\,(\gamma\,\lambda)\, y_{t-1} + \\ + (1-\mu)\,(\delta\rho)\, m_t - \alpha\,(1-\mu)\,(\delta\rho) m_{t-1} + \\ + [\,\mu\,\epsilon_t^u + (1-\mu)\,\epsilon_t^c - \alpha\,(1-\mu)\,\epsilon_{t-1}^c]$$

Estimation of (A7) allows to identify the following (combinations of) parameters: α, β, μ, $(\gamma\lambda)$, and $(\delta\rho)$.

Equation (1) of the paper is the reduced-form equivalent of (A7).

Appendix 2

This appendix discusses variable definitions, data sources and data transformations corresponding to the variables in equations (1) and (3). It also presents the data series for the non-financial public sector deficit, public saving, private saving, and private disposable income used in the panel estimation of equation (3).

1. Original Variables

The following original variables were obtained from the World Bank ANDREX data base, (which compiles data from U.N. National Accounts, IFS (IMF), and national sources):

(a) Current-Price Local Currency Data:

Total consumption, money and quasi-money, private consumption and gross domestic product and gross national product, both at market prices.

(b) 1980 Constant-Price Local Currency Data:

Government consumption, total consumption, gross domestic investment, gross national product at market prices, goods and non-factor services exports and private consumption.

(c) Population Data: Total population.

(d) Price Data: Period average exchange rate.

The following original variables were obtained from the SAVEM data base, World Bank (which compiles data from U.N. National Accounts, among other sources):

Current-Price Local Currency investment, gross national saving and GDP.

The source of the nominal interest rate is the IFS data bank, IMF.

The sources for the operational non-financial public sector deficit (% of GDP, at current prices) for Latin American countries are:

(a) Argentina: Kiguel, M. and N. Liviatan (1989) and ECLAC Project on Fiscal Policies, Santiago, Chile.

(b) Brazil, Chile, Colombia, Costa Rica, Mexico, Peru and Venezuela: ECLAC Project on Fiscal Policies.

The sources for non-financial public sector investment (% of GDP, at current prices) for Latin American countries are:

(a) Argentina, Brazil, Chile, Costa Rica and Venezuela: ECLAC Project on Fiscal Policies.

(b) Colombia: Colombia CEM, World Bank.

(c) Mexico: proportion of Public Investment/Gross Domestic Investment at constant prices, from Banco de Mexico: Indicadores Económicos, Dec. 1989) applied to the Gross Domestic Investment/GDP share (at current prices, from ANDREX, World Bank).

(d) Peru: proportion of Public Investment/Gross Domestic Investment (at constant prices, from IDB: Economic and Social Progress in Latin America, 1989, Table IX-2, p.203) applied to the Gross Domestic Investment/GDP share (at current prices, from ANDREX, World Bank).

Additional country-specific variables for the 5 non-Latin American countries were obtained from the following sources:

(a) Ghana: non-financial public sector deficit and public investment/GDI share from Islam and Wetzel (1990).

(b) Pakistan: public sector figures from Pakistan Economic Survey.

(c) Philippines: public sector figures were obtained from Easterly (1989). Figures for 1980 were not available; we assumed the 1981 proportion to GDP.

(d) Thailand: public sector figures were obtained from Easterly and Honohan (1990). Figures for 1980 were not available; we assumed the 1981 proportion to GDP.

(e) Zimbabwe: figures for the public sector were obtained from Schmidt-Hebbel (1990).

2. Transformed Variables

2.1 For Equation (1)

The per capita constant-price (in 1980 US$) series for c, y, and m were obtained by dividing local-currency constant price private consumption, GNP and broad money (the sum of money and quasi-money) by the period-average 1980 nominal exchange rate and the population.

2.2 For Equation (3)

Current-Period Variables

Current-price public saving was obtained by subtracting the operational non-financial public sector deficit from non-financial public sector investment. To obtain private saving next, either foreign saving and public saving were subtracted from gross domestic investment or public saving was deducted from gross national saving. Private disposable income is the sum of private saving and private consumption.

Table A1 presents the 13-country 1980-87 time series for the current-price local currency GDP shares of the operational non-financial public sector deficit, public saving, private saving, and private disposable income. Note that the private consumption/private disposable income ratio, which is the dependent variable in equation (3), is obtained by simple transformations of the two latter variables.

rermanent Disposable Income

For the estimate of permanent private disposable income at current prices (which is divided by current-period private disposable income at current prices in equation 3), first real private disposable is obtained by dividing current-price private disposable income (DY_p) by the GNP deflator. Next, for Brazil, Colombia, Pakistan, Thailand and Venezuela constant-price permanent private disposable income (real PDY_p) was obtained by estimating the 1980-87 deterministic trend. For Argentina, Chile, Costa Rica, Ghana, Mexico, Peru, Philippines, and Zimbabwe the trend was not significant, therefore real PDY_p was defined as the sample arithmetic average of the real DY_p series. Finally, current-price permanent private disposable income (PDY_p) was obtained by multiplying the real PDY_p by the GNP deflator.

Permanent Public Saving

Two extreme alternatives for current-price permanent public saving (which is divided by current-period private disposable income at current prices in equation 3) were used for the estimations. The first one is a partial forward looking option, which specifies expected long-term public saving as an arithmetic average of actual current and future public saving levels, two periods into the future: $PS_{Gt}=[\sum_{i=0}^{2} S_{Gt+i}]/3$. The second option corresponds to static expectations: $PS_{Gt}=S_{Gt}$.

Inflation and Interest Rates

The inflation rate, corresponding to the private consumption deflator, was normalized as follows: $INF=(\Delta P_{ct}/P_{ct-1})/(1+\Delta P_{ct}/P_{ct-1})$.

The real interest rate (r) is measured ex-post using the standard Fisher equation : $r=(1+i)/(1+\Delta P_{ct}/P_{ct-1})-1$, where i is the nominal interest rate.

TABLE A1

Operational Non-Financial Public Sector Deficit
(% of GDP at current prices)

	ARG	BRA	CHL	COL	CRI	MEX	PER	VEN	GHA	PAK	PHL	THA	ZWE
1980	4.4	1.2	-5.4	2.5	12.7	6.1	3.9	-4.3	2.3	4.4	3.0	8.6	9.8
1981	6.2	3.4	-0.4	6.9	4.6	10.1	6.7	-0.6	0.7	4.1	3.2	6.7	5.9
1982	5.6	4.3	3.9	7.5	6.9	6.0	7.3	12.2	0.0	5.9	1.7	6.7	10.2
1983	8.8	3.8	3.5	7.7	0.9	2.0	9.8	2.2	-2.4	5.6	2.4	5.3	7.0
1984	8.0	3.1	4.5	6.1	0.2	1.0	6.2	-10.1	-1.3	7.1	-2.8	5.5	15.4
1985	4.4	3.7	2.9	2.9	0.8	1.4	2.4	-6.9	0.6	7.6	-2.8	5.3	15.4
1986	2.0	2.6	1.5	2.6	2.0	4.7	4.9	1.4	-4.8	9.6	-2.3	3.3	8.2
1987	4.3	4.3	-0.3	-0.7	0.4	-0.5	6.5	-0.5	-5.7	8.4	-2.8	0.3	6.6

Public Saving
(% of GDP at current prices)

	ARG	BRA	CHL	COL	CRI	MEX	PER	VEN	GHA	PAK	PHL	THA	ZWE
1980	4.7	8.3	10.6	5.2	0.3	4.6	5.1	20.2	4.6	15.5	11.7	16.9	14.5
1981	2.3	7.7	5.5	1.7	6.1	2.0	2.9	19.9	2.3	13.3	11.9	15.0	11.2
1982	2.5	4.6	0.8	1.9	3.9	4.4	6.8	10.5	0.9	16.7	8.3	15.0	20.0
1983	0.2	3.2	1.3	1.1	10.4	4.6	3.4	13.8	-1.7	16.0	10.0	12.8	18.1
1984	-0.8	3.3	1.5	2.9	9.6	5.6	3.5	21.4	0.0	17.1	1.7	13.2	22.4
1985	2.2	3.3	4.2	6.7	8.7	5.4	6.5	15.8	2.7	17.7	0.4	13.1	21.7
1986	5.1	7.4	9.2	5.9	10.1	1.^	3.2	13.3	-2.9	20.4	1.3	10.3	14.0
1987	3.3	6.4	10.4	9.1	9.3	6.	1.3	12.9	-3.2	18.7	2.2	6.8	12.6

Private Saving
(% of GDP at current prices)

	ARG	BRA	CHL	COL	CRI	MEX	PER	VEN	GHA	PAK	PHL	THA	ZWE
1980	14.1	9.2	3.5	14.6	11.5	17.5	17.8	13.0	-0.1	-9.8	13.2	2.4	0.0
1981	13.5	9.3	2.8	14.2	7.7	21.5	19.1	-0.3	1.4	-7.0	12.6	3.4	2.0
1982	11.0	10.9	0.5	11.2	8.3	16.1	15.6	5.4	2.5	-9.4	11.7	4.8	-8.5
1983	13.6	8.2	3.3	14.3	3.2	19.9	13.8	3.9	1.4	-9.0	8.5	5.2	-9.2
1984	9.0	12.2	1.6	13.7	5.5	16.7	17.4	2.0	5.2	-10.8	12.8	6.2	-5.9
1985	4.9	13.3	1.5	12.1	5.5	17.1	15.4	7.3	3.2	-13.1	14.0	6.3	-3.5
1986	0.4	9.5	-2.2	18.8	9.1	16.0	16.1	3.9	6.8	-11.5	15.8	11.8	5.1
1987	2.0	15.4	2.6	11.0	10.5	15.2	15.9	9.4	8.4	-7.0	13.6	17.4	6.7

Private Disposable Income
(% of GDP at current prices)

	ARG	BRA	CHL	COL	CRI	MEX	PER	VEN	GHA	PAK	PHL	THA	ZWE
1980	80.3	79.5	74.2	84.8	77.0	82.6	79.1	67.9	83.8	73.3	80.5	69.0	64.5
1981	82.0	79.2	77.3	86.7	67.9	85.9	82.3	57.6	88.6	73.6	80.4	69.1	69.0
1982	79.7	81.2	75.8	84.1	66.1	77.7	77.3	67.8	92.3	71.9	80.6	70.7	56.5
1983	78.3	81.6	76.6	86.2	64.7	80.8	78.6	71.5	92.2	71.2	78.3	71.0	59.6
1984	82.5	83.0	74.6	84.3	66.8	79.8	79.9	64.4	91.1	69.4	87.4	71.6	53.3
1985	78.7	82.0	70.8	81.1	66.1	81.1	77.2	70.1	86.3	68.6	90.6	71.7	52.0
1986	77.5	78.2	66.7	84.1	68.4	83.7	83.6	72.5	89.4	64.8	91.5	77.0	59.6
1987	80.3	77.2	70.2	77.4	70.0	79.3	84.0	74.0	90.0	65.6	87.8	81.4	59.4

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